



The City of San Diego
Development Services

Technical Policy B-16-1

Subject: Alternative Shearwall Uplift Anchoring Devices

Code Edition: 2001 California Building Code

Code Section : CBC Section 1630.8

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Approved By: Signed Copy on File

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During the past few years we have received numerous requests from manufacturers and design engineers to permit the use of a non-conventional hold-down anchoring systems in multi-story wood framed buildings. This alternative anchorage method utilizes a continuous or coupled rod or cable that transfers shearwall uplift forces down to the foundation. Uplift forces are transferred to the tension or cable system via metal bearing plates that resist the uplift forces in bearing above the shearwall top plate or via a bolted hold-down device.

As a result of exhaustive discussions with Senior staff, and various manufacturers, the use of these rod/cable based hold-down systems can be installed in wood framed buildings of any height and number of stories permitted by the California Building Code (CBC) if the following conditions are satisfied. This policy is intended to supercede all prior written or oral policies related to this issue.

1. All components used in the design of the hold-down system shall be addressed and evaluated under a current ICBO evaluation report.
2. Design calculations shall be provided for each project based on proposed rod or cable size and material properties as well as the accumulated tension loads that are to be delivered to the foundation.
 - a. Hold down system connection elements, including the tension rod, bearing plates, and hold down transfer connectors shall be capable of transferring the seismic uplift force from the shear wall to the foundation and shall be designed to resist the combined loads of Section 1612.2 or Section 1612.3 of the 2001 CBC.
 - b. Design calculations for the hold down system shall include rod elongation calculations based on the proposed rod size and material properties, as well as the accumulated tension loads that must be delivered to the foundation. Maximum rod elongation shall not exceed 1/8 inch per floor, under the load combinations of Section 1612.3 of the 2001 CBC.
3. Wood shrinkage calculations shall be provided for each project as required in Section 2308 "Wall Framing" of the 2001 CBC.
4. Structural observation shall be provided by the engineer of record per item 5 in Section 1702 "Structural Observation". The structural observation is to verify that the boundary nailing and hold-down hardware, including necessary shrinkage compensating devices, are installed in the appropriate locations and that the system is installed in substantial conformance to the intended design.
5. Shrinkage compensating devices shall be provided at every floor level. In addition to compensating for the effects of wood shrinkage, these devices also mitigate the detrimental impacts of energy dissipation, such as wood crushing and rod elongation during successive lateral load cycles.
6. Hold-down load-transfer devices shall be provided at each floor level to transfer uplift forces to

- the tension rod or cable system.
- a. Bearing plates and hold-down connectors resisting uplift forces from more than one floor level reduce redundancy in the overall shearwall system.
 - b. On a case by case basis uplift forces from multiple floors may be resisted by a common bearing plate or bolted hold-down connector if the aspect ratio of the shearwall system includes the overall height between top most wall and the sill plate of the lowest wall since the hold-down system defines the boundaries of the shearwall.
7. Mixing of different hold-down systems in conjunction with rod/cable systems along a common run of uplift restraint shall not be permitted due to potential incompatibility.
 8. Job-specific shearwall wall elevations must be provided and shall show: connection details, the location and size of rods/cables and bearing plates, the location of takeup-shrinkage compensating devices and coupling nuts and load transfer mechanisms other than bearing plates connecting to the wood framing system.
 9. Where the tie-down rod or cable terminates at other than the foundation (or rigid base such as an elevated structural concrete slab) intermediate floor and vertical framing elements completing the load path down to the foundation or rigid base shall be designed to comply with the requirements of Section 1630.8.2 of the 2001 CBC for elements supporting discontinuous systems.

This policy reflects current practice and may be superceded by future updates that will be published as is deemed necessary. The most current version copy will be posted on the Development Services home page on the worldwide web at www.sandiego.gov.
